



## Workshop Report

### ***Higher Resolution SRTM Data & Flood Modelling Workshop***

***May 25th – 29th 2015, Tonantzintla and Puebla, México***

#### Objective and Goal

The objective of this workshop was to build capacity in understanding and using the 30m digital elevation model (DEM) derived from the Shuttle Radar Topography Mission-2 (SRTM-2) data in two open-source flood models, TerraHidro and CREST.

#### Participant Profile

Participants were government technical personnel knowledgeable in GIS, some who use flood models in their regular work (e.g. hydrologists from ministries of water, agriculture, natural resources, disaster management); disaster management specialists from outside government who are similarly knowledgeable in GIS; and professors / instructors in GIS or remote sensing.

The workshop was attended by 27 participants from 11 countries in Latin America and the Caribbean: Brazil, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Uruguay, and Venezuela. The participants came from institutions in charge of disaster reduction, civil protection, national mapping, sustainable development, meteorological services, and space, as well as from academic and research institutions with programs in ecosystem vulnerability and biology, which also benefit from the use of timely and accurate information.

#### Co-organizers

The workshop was organized by the Working Group on Capacity Building and Data Democracy (WGCapD) of the Committee on Earth Observation Satellites (CEOS) and hosted by the Regional Centre for Space Science Education for Latin America and the Caribbean (CRECTEALC). The workshop was further supported programmatically and financially by the Secure World Foundation (SWF), the National Institute for Astrophysics, Optics and Electronics (INAOE), the Benemérita Autonomous University of Puebla (BUAP), the Group on Earth Observations (GEO), the Mesoamerican Centre for Theoretical Physics (MCTP), and the United Nations Office for Outer Space Affairs (UNOOSA).



Group photograph of participants and instructors

### Financial Support

Financial support to defray the cost of air travel of 16 participants and three instructors, hotel accommodations for 22 participants, local transportation and lunch for all participants, simultaneous English-Spanish interpretation, and technical meeting logistics was provided by MCTP, SWF, GEO Secretariat, CRECTEALC, and INAOE. Supplies, a classroom equipped with 31 personal computers, and technical support personnel were provided by the BUAP. CRECTEALC and INAOE provided a welcome reception and a farewell dinner for all participants.

### Overview of the Program

The main goal of the workshop was to continue promoting the use of Earth Observation (EO) images for disaster reduction, in particular the resources made available by the Global Earth Observation System of Systems (GEOSS) and the capacity building and relevant resources available for Latin America and the Caribbean under the EOPOWER project of the European Commission.

The program focused on:

- Training in the use of and access to satellite imagery of the SRTM-30m dataset
- Training in the use of TerraHidro (a TerraView Plugin), developed by the image processing division of the National Institute for Space Research (INPE) of Brazil for generating hydrological models and estimating flood risk with images using SRTM-30m and SRTM-90m DEMs
- Training in the use of CREST (Coupled Routing and Excess STorage model) and TauDEM, a QGIS plugin. The purpose of this was to generate a distributed hydrological model to simulate the spatial and temporal variation of land surface and subsurface water flow.
- Disseminating freely accessible software, data, and information.

To ensure that workshop participants had the opportunity to use the knowledge and skills acquired upon returning to their home countries, the National Aeronautics and Space Administration (NASA) and the United States Geospatial Survey (USGS) loaded the STRM-derived DEMs for the entire Latin America and Caribbean region on portable drives and provided them to the participants. This enabled participants to have the data for their countries and access the freely-available models on which they had trained.

### Main Topics

- Introduction to DEMs and SRTM Versions
- Introduction to CEOS and SRTM Project
- AmeriGEOSS: A regional initiative between GEO's 15 member countries and Americas' participating organizations
- TerraHidro – Introduction/Theoretical Concepts – Platform for spatially distributed Hydrological Modeling
- TerraHidro – Tools and Usage Examples – Guided Exercises
- SRTM Versions and Access - SRTM 30-m Data Access
- SMAP Overview and Status
- El Proyecto EOPOWER – participación y contribución de América Latina y el Caribe
- GeoSUR Introduction
- River Watch & MODIS NRT for Flood Response & Water Resource Management
- GeoSUR SRTM 30 m TPS
- CREST: Introduction, Installing QGIS & TauDEM
- CREST: Overview of Hydro Models
- CREST: EF5 Overview - DEM Derivatives - Rainfall and PET - Automatic Calibration
- CREST: Using and Interpreting Model Output
- Comparación de Módulos de Hidrología en Sistemas de Información Geográfica (discussion)
- Workshop Feedback



*Dr. Sergio Rosim (INPE) describing TerraHidro results*

## Presenters and Instructors

- Patrick O'Brien (NOAA)
- Nancy Searby (NASA)
- Sergio Rosim (INPE)
- Erika Podest (NASA)
- Sergio Camacho (CRECTEALC)
- Eric Van Pragh (ESRI)
- Bob Brakenridge (University of Colorado)
- Matt Cushing (USGS)
- Robert Clark (University of Oklahoma)
- Zac Flamig (University of Oklahoma)
- Mayeli Sánchez, (PODER)



*Participants also had the opportunity to present on activities from their own institutions. Here Ms. Paulina Tedesco (Uruguay) presented work of the Meteorology Institute of Uruguay.*

## Discussion and main recommendations

The workshop program concluded with a discussion on challenges pertaining to the application of DEM data in case studies and hurdles foreseen by participants. This discussion was followed by a numerical and essay evaluation by the workshop participants. In the numerical grading part of the evaluation, the participants expressed their views on: i) course content, ii) quality of the information provided, iii) whether examples and hands-on time were sufficient, iv) whether documents and materials were adequate and understandable, v) opportunities to discuss with other participants, vi) applicability of skills and capabilities acquired to the participant's work, and vii) general satisfaction with the course.

On a scale of 1 to 5, with 1 being “poor” and 5 being “excellent,” the average overall grading was 4.77. The lowest grading was 4.39, which corresponds to iii) whether examples and hands-on time were sufficient. Some participants expressed that more time could have been dedicated to presentation of examples of flood modelling and time available for hands-on exercises.

During the discussion, several participants indicated their intention of using TerraHidro and CREST in their work. Some participants stated they felt confident to provide training to other colleagues in the use of these models with the SRTM DEM data provided by NASA/USGS.

One of the cartographic agencies made a proposal to form a working group to exchange experiences in the use of DEM-30m in flood models and to arrange for further national and regional training. For this purpose, focal points, one or more for each country, would be identified. The focal points would coordinate among themselves to assign one or more coordinators to lead the development of a work plan. CRECTEALC offered to send the list of email addresses of participants to all and to invite them to become focal points for distributing information in their countries. The replies received will be distributed to all focal points to initiate the process of development of a work plan.

In side conversations, two other possibilities of further capacity building emerged: (1) cooperation on further programming of the TerraHidro model in collaboration with INPE, and (2) to examine possibilities for additional training on the use of the TerraMA<sup>2</sup> model as preparation for training on SMAP data. Together with the use of TerraHidro and CREST, participating planning and operational institutions of the region would be able to better address flooding and drought, which are severe problems for most countries in the Latin America and Caribbean region. At the national level, INEGI and CRECTELAC/INAOE agreed to examine the possibility of reproducing the SRTM workshop at INEGI Headquarters with the participation of technical personnel from all stakeholders involved in the prevention and response of water-related disasters.

The participants expressed their appreciation to the co-organizers for their financial and technical support that made possible the quality education received. In particular, the participants expressed their appreciation to the organizers for providing them with the tools with which they could enhance the quality of the information to be generated in their daily work. The participants also expressed their appreciation to INAOE, BUAP, and CRECTEALC for the excellent hosting arrangements made for the workshop.